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EXAMINER	
PATHAK, SUDHANSHU C	
ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/29/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/608,556	LEMBERGER ET AL.
	Examiner	Art Unit
	Sudhanshu C. Pathak	2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *June 30th, 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *June 30th, 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-to-35 are pending in the application.

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement.

It is recommended that the abstract be amended so as to provide further detail of the invention.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 1-35 are rejected under 35 U.S.C. 101.

In regards to Claim 28 (independent claim), the claim discloses software for performing certain operations i.e. discloses "functional descriptive material". However, "descriptive material" is nonstatutory when claimed as descriptive material. When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will

be statutory. (Page 50, Paragraphs 1-2—Interim Guidelines). A recommended amendment to the claim is suggested "A computer readable medium storing a computer executable instructions...that, when executed by a computer, result in:...".

In regards to Claims 29-30 (dependent claims) are rejected as being dependent on above rejected independent claims.

In regards to Claim 25 the claim calls for a seemingly a statutory process but in reality seeking patent protection on an abstract idea (algorithm) in the form of a computer program as evidenced by Claim 28. (Page 23 – Interim Guidelines).

In regards to Claims 26-27 (dependent claims) are rejected as being dependent on above rejected independent claims.

In regards to Claims 1, 9, 17 & 31 (independent Claims), Claims 1, 9, 17 & 31 merely discloses a computer program (functional descriptive steps), producing no practical application, and do not define any structural and functional interrelationship between the computer programs and other claimed elements of a computer which permit the computer program functionality to be realized, thereby producing no tangible, concrete and useful results. (See Pages 52-54 of the Interim Guidelines). The claim discloses a demodulator to select a demodulated codeword however, this is implemented in software as evidenced by Claim 28, and furthermore, there is no concrete output of the demodulator. Claim 31 discloses further details of the demodulator, wherein as evidenced by Fig. 2, it is implemented as a processor, wherein the functionality (filter, correlator etc.) are implemented as software, wherein there is no (tangible) output out of the processor.

In regards to Claims 2-8, 10-16 & 18-24 (dependent claims) are rejected as being dependent on above rejected independent claims.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-2 & 8 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

In regards to Claims 1-2 & 8, the claims are single means claim (a demodulator), i.e., where a means recitation does not appear in combination with another recited element of means, is subject to an undue breadth rejection under 35 U.S.C. 112, first paragraph. In re Hyatt, 708 F.2d 712, 714-715, 218 USPQ 195, 197 (Fed. Cir. 1983) (A single means claim, which covered every conceivable means for achieving the stated purpose was held nonenabling for the scope of the claim because the specification disclosed at most only those means known to the inventor.). When claims depend on a recited property, a fact situation comparable to Hyatt is possible, where the claim covers every conceivable structure (means) for achieving the stated property (result) while the specification discloses at most only those known to the inventor.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 20 recites the limitation "said filter" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1-5, 8 (apparatus) & 9-13, 16 (system) & 25-27 (method) & 31-32, 34 (apparatus) are rejected under 35 U.S.C. 102(b) as being anticipated by Lee et al. (Lee & Messerschmitt; Digital Communications; Copyright 1988, Kluwer Academic Publishers; Pages 257-259, 264-269).

In regards to Claims 1, 9 & 25, Lee discloses an apparatus (system) comprising: a demodulator (Pages 257-259, Sec. 7.2.1, ML Detector & Fig. 7-7 & Fig. 7-8) {Interpretation: The maximum likelihood detector is interpreted as a demodulator} to demodulate a received signal (Page 264, Fig. 7-5, element Y_k & Page 265, lines 5-9) {Interpretation: the observation vector is interpreted as the received signal} by selecting a demodulated codeword corresponding to a channel-influenced codeword based on a proximity relation between said received signal and said channel-influenced codeword (Page 265, lines 1-15 & Eq. 7.49 & Fig. 7-7 & 7-8) {Interpretation: The reference discloses selecting a data symbol "a" from a set of

possible data symbols as defined in $\Omega_A = \{a_1.....a_K\}$, corresponding to the channel influenced symbol, based on the proximity relation between the received signal "y" and channel influenced symbol "ah" as defined in Eq. 7.49, wherein "h" is defined as the channel impulse response. The data symbol transmitted and demodulated is interpreted as any data i.e. codewords}. Lee further discloses the communication system comprising a transmitter to transmit a signal through a communication channel and a receiver receiving the transmitted signal (Page 264, Fig. 7-5 & Page 265, lines 1-3 & Page 266, Fig. 7-7, elements "channel", "ML detector") {Interpretation: A transmitter, receiver and channel are inherent}.

In regards to Claims 2, 10 & 27, Lee discloses an apparatus comprising a demodulator as described above. Lee further discloses said demodulator is able to determine said proximity relation by calculating a minimal Euclidian distance between said received signal and said channel-influenced codeword (Page 265, lines 10-15 & Eq. 7.49) {Interpretation: The ML detector computes the equation 7.49 which minimizes the Euclidean distance between the received signal "y" and the channel influenced signal "ah". Furthermore, minimizing the Euclidean distance to determine the received signal is inherent in a ML detector as is disclosed on Pages 257-259}.

In regards to Claims 3 & 11, Lee discloses an apparatus comprising a demodulator as described above. Lee further discloses the apparatus comprising an intermittent filter to individually sample a received codeword containing sampled symbols of said received signal, and to calculate a correlation between said received

codeword and a sampled channel response containing channel response samples (Eq. 7.51 & Page 265, lines 20-24 & Fig. 7-6 & Fig.'s 7-7, 7-8, elements "matched filter") {Interpretation: The reference discloses a discrete time matched filter which performs a correlation between the received samples "Y_k" and channel response samples "h_k". Furthermore, since the filter is a discrete-time filter a sampler is inherent so as to sample the continuous time received signal, before performing the filtering i.e. to generate "Y_k" & "h_k"}.

In regards to Claims 4 & 12, Lee discloses an apparatus comprising a demodulator and filter as described above. Lee further discloses said filter comprising a finite impulse response matched filter (Eq. 7.51 & Page 265, lines 1-4, 20-24 & Fig. 7-6 & Fig.'s 7-7, 7-8, elements "matched filter" & Page 268, lines 12) {Interpretation: The reference discloses a matched filter models the impulse response of the channel and is implemented as a finite impulse response filter}.

In regards to Claims 5 & 13, Lee discloses an apparatus comprising a demodulator as described above. Lee further discloses a decoder to select said demodulated codeword out of a set of possible codewords, based on a filtered signal and an energy-related function of said channel-influenced codeword (Fig. 7-7, elements "matched filter", mixer, subtractor, "select largest" & Page 265, Eq. 7.50) {Interpretation: The filtered signal is interpreted as "Y_k" through the matched filter in Fig. 7-7 and the first term of Eq. 7.50; the energy-related function of said channel-influenced codeword is interpreted as the term inputted into the subtractor of Fig. 7-7 and the second term of Eq. 7.50}.

In regards to Claims 8, 16 & 26, Lee discloses an apparatus comprising a demodulator as described above. Lee further discloses said channel-influenced code word comprises a convolution of the channel response over a respective codeword (Page 265, Eq. 7.49, "ha" & Fig. 7-7, element "h_k") {Interpretation: The reference discloses the term "ha" in Eq. 7.49, which is a convolution operation between the channel impulse response "h" and a respective codeword "a"}.

In regards to Claims 31-32, Lee discloses a demodulator (Page 266, Fig. 7-7) comprising an intermittent filter to individually sample a received codeword containing sampled symbols of said received signal, and to calculate a correlation between said received codeword and a sampled channel response containing channel response samples wherein the filtered signal comprises symbols contained in an output of the filter (Eq. 7.51 & Page 265, lines 20-24 & Fig. 7-6 & Fig.'s 7-7, 7-8, elements "matched filter") {Interpretation: The reference discloses a discrete time matched filter which performs a correlation between the received samples "Y_k" and channel response samples "h_k". Furthermore, since the filter is a discrete-time filter, a sampler is inherent so as to sample the continuous time received signal, before performing the filtering i.e. to generate "Y_k" & "h_k"}; a correlator to compute one or more correlation values, corresponding to a correlation between a filtered signal and one or more respective codewords (Fig. 7-7, elements "mixer(s)") {Interpretation: The reference in Fig. 7-7 discloses the multiplier(s) or mixer(s) symbols are interpreted as correlators}; a subtractor to subtract an energy-related function from an output of said correlator (Fig. 7-7, element(s) "subtractor") {Interpretation: The

energy-related function of said channel-influenced codeword is interpreted as the term inputted into the subtractor of Fig. 7-7 and the second term of Eq. 7.50}; and a selector to select a demodulated codeword corresponding to a maximum value output of said subtractor (Fig. 7-7, element "select largest").

In regards to Claim 34, Lee discloses an apparatus comprising a demodulator and filter as described above. Lee further discloses said filter comprising a finite impulse response matched filter (Eq. 7.51 & Page 265, lines 1-4, 20-24 & Fig. 7-6 & Fig.'s 7-7, 7-8, elements "matched filter" & Page 268, lines 12) {Interpretation: The reference discloses a matched filter models the impulse response of the channel and is implemented as a finite impulse response filter}.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 6-7 (apparatus) & 14-15 (system) & 28-30 (computer readable medium) & 33, 35 (apparatus) are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (Lee & Messerschmitt; Digital Communications; Copyright 1988, Kluwer Academic Publishers; Pages 257-259, 264-269) in view of Webster et al. (6,233,273).

In regards to Claims 6 & 14, Lee discloses an apparatus comprising a demodulator and decoder as described above. Lee further discloses an intermittent

filter to individually sample a received codeword containing sampled symbols of said received signal, and to calculate a correlation between said received codeword and a sampled channel response containing channel response samples (Eq. 7.51 & Page 265, lines 20-24 & Fig. 7-6 & Fig.'s 7-7, 7-8, elements "matched filter") {Interpretation: The reference discloses a discrete time matched filter which performs a correlation between the received samples "Y_k" and channel response samples "h_k". Furthermore, since the filter is a discrete-time filter a sampler is inherent so as to sample the continuous time received signal, before performing the filtering i.e. to generate "Y_k" & "h_k"}. However, Lee does not disclose the filtered signal comprises a combination of interference and an output of the filter and further a decision feedback equalizer to calculate an inter symbol interference of said demodulated codeword.

Webster discloses a decision feedback equalizer to calculate an inter symbol interference of the demodulated codeword which serves to cancel inter symbol interference (Fig. 10, element 107, 104 & Abstract, lines 6-10 & Column 4, lines 23-27, 48-57 & Fig. 6, element 36 & Fig. 8, elements 74-76 & Fig. 12, element 1220) {Interpretation: The reference discloses a decision feedback equalizer which calculates the effects of the inter symbol interference to be canceled from the filtered signal wherein the filtered signal is interpreted as a combination of signal filtered by the matched filter including the interference component which is not canceled by the matched filter}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Webster teaches implementing a decision feed

back filter and this is implemented in the demodulator as described in Lee so as to cancel the effects of both intersymbol interference in the form of post-coursor multipath echo.

In regards to Claims 7 & 15, Lee discloses an apparatus comprising a demodulator and decoder as described above. However, Lee does not disclose the decoder comprising a fast walsh transform correlator.

Webster discloses a correlator implemented as a fast walsh structure (Column 4, lines 64-65 & Column 10, lines 4-5) {Interpretation: The reference discloses a fast walsh structure for the implementation of the correlation function}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Webster discloses a correlator implemented in a fast walsh structure and this is implemented in the decoder as described in Lee so as to implement the energy relate function operation with reduced complexity.

In regards to Claim 28, Lee discloses an apparatus (system) comprising: a demodulator (Pages 257-259, Sec. 7.2.1, ML Detector & Fig. 7-7 & Fig. 7-8) {Interpretation: The maximum likelihood detector is interpreted as a demodulator} to demodulate a received signal (Page 264, Fig. 7-5, element Y_k & Page 265, lines 5-9) {Interpretation: the observation vector is interpreted as the received signal} by selecting a demodulated codeword corresponding to a channel-influenced codeword based on a proximity relation between said received signal and said channel-influenced codeword (Page 265, lines 1-15 & Eq. 7.49 & Fig. 7-7 & 7-8) {Interpretation: The reference discloses selecting a data symbol "a" from a set of

possible data symbols as defined in $\Omega_A = \{a_1.....a_k\}$, corresponding to the channel influenced symbol, based on the proximity relation between the received signal "y" and channel influenced symbol "ah" as defined in Eq. 7.49, wherein "h" is defined as the channel impulse response. The data symbol transmitted and demodulated is interpreted as any data i.e. codewords}. Lee further discloses the communication system comprising a transmitter to transmit a signal through a communication channel and a receiver receiving the transmitted signal (Page 264, Fig. 7-5 & Page 265, lines 1-3 & Page 266, Fig. 7-7, elements "channel", "ML detector") {Interpretation: A transmitter, receiver and channel are inherent}. However, Lee does not disclose implementing the demodulator on a computer readable medium storing a computer program executing the steps of the demodulator.

Webster discloses a spread spectrum receiver (Abstract, lines 1-5 & Column 1, lines 14-30). Webster further discloses implementing the receiver functionality including demodulator as a field programmable gate array (FPGA) or an application specific integrated circuit (ASIC) (Column 5, lines 54-60 & Claim 3 & Fig. 10) {Interpretation: The reference discloses the receiver demodulator as described in Fig. 10 is implemented in an FPGA or ASIC}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Webster discloses implementing a receiver demodulator on an FPGA requiring instructions to be executed and this is implemented in the apparatus as described in Lee so as to be able to provide the flexibility to change the functionality by changing the instructions

and implementing the receiver on an integrated circuit thus minimizing the complexity of the receiver.

In regards to Claim 29, Lee in view of Webster discloses a demodulator implemented on a computer readable medium having stored thereon computer instructions as described above. Lee further discloses said channel-influenced code word comprises a convolution of the channel response over a respective codeword (Page 265, Eq. 7.49, "ha" & Fig. 7-7, element "h_k") {Interpretation: The reference discloses the term "ha" in Eq. 7.49, which is a convolution operation between the channel impulse response "h" and a respective codeword "a"}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Lee in view of Webster satisfies the limitations of the claim.

In regards to Claim 30, Lee in view of Webster discloses a demodulator implemented on a computer readable medium having stored thereon computer instructions as described above. Lee further discloses said demodulator is able to determine said proximity relation by calculating a minimal Euclidian distance between said received signal and said channel-influenced codeword (Page 265, lines 10-15 & Eq. 7.49) {Interpretation: The ML detector computes the equation 7.49 which minimizes the Euclidean distance between the received signal "y" and the channel influenced signal "ah". Furthermore, minimizing the Euclidean distance to determine the received signal is inherent in a ML detector as is disclosed on Pages 257-259}. Therefore, it would have been obvious to one of ordinary skill in the art at

the time of the invention that Lee in view of Webster satisfies the limitations of the claim.

In regards to Claim 33, Lee discloses an apparatus comprising a demodulator and decoder as described above. However, Lee does not disclose the filtered signal comprises a combination of interference and an output of the filter and further a decision feedback equalizer to calculate an inter symbol interference of said demodulated codeword.

Webster discloses a decision feedback equalizer to calculate an inter symbol interference of the demodulated codeword which serves to cancel inter symbol interference (Fig. 10, element 107, 104 & Abstract, lines 6-10 & Column 4, lines 23-27, 48-57 & Fig. 6, element 36 & Fig. 8, elements 74-76 & Fig. 12, element 1220) {Interpretation: The reference discloses a decision feedback equalizer which calculates the effects of the inter symbol interference to be canceled from the filtered signal wherein the filtered signal is interpreted as a combination of signal filtered by the matched filter including the interference component which is not canceled by the matched filter}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Webster teaches implementing a decision feed back filter and this is implemented in the demodulator as described in Lee so as to cancel the effects of both intersymbol interference in the form of post-coursor multipath echo.

In regards to Claim 35, Lee discloses an apparatus comprising a demodulator and decoder as described above. However, Lee does not disclose the correlator comprising a fast walsh transform correlator.

Webster discloses a correlator implemented as a fast walsh structure (Column 4, lines 64-65 & Column 10, lines 4-5) {Interpretation: The reference discloses a fast walsh structure for the implementation of the correlation function}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Webster discloses a correlator implemented in a fast walsh structure and this is implemented in the decoder as described in Lee so as to implement the energy relate function operation with reduced complexity.

13. Claims 17-21 & 24 (system) are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (Lee & Messerschmitt; Digital Communications; Copyright 1988, Kluwer Academic Publishers; Pages 257-259, 264-269) in view of Driessen et al. (5,936,578).

In regards to Claim 17, Lee discloses an apparatus (system) comprising: a demodulator (Pages 257-259, Sec. 7.2.1, ML Detector & Fig. 7-7 & Fig. 7-8) {Interpretation: The maximum likelihood detector is interpreted as a demodulator} to demodulate a received signal (Page 264, Fig. 7-5, element Y_k & Page 265, lines 5-9) {Interpretation: the observation vector is interpreted as the received signal} by selecting a demodulated codeword corresponding to a channel-influenced codeword based on a proximity relation between said received signal and said channel-influenced codeword (Page 265, lines 1-15 & Eq. 7.49 & Fig. 7-7 & 7-8)

{Interpretation: The reference discloses selecting a data symbol "a" from a set of possible data symbols as defined in $\Omega_A = \{a_1.....a_k\}$, corresponding to the channel influenced symbol, based on the proximity relation between the received signal "y" and channel influenced symbol "ah" as defined in Eq. 7.49, wherein "h" is defined as the channel impulse response. The data symbol transmitted and demodulated is interpreted as any data i.e. codewords}. Lee further discloses the communication system comprising a transmitter to transmit a signal through a communication channel and a receiver receiving the transmitted signal (Page 264, Fig. 7-5 & Page 265, lines 1-3 & Page 266, Fig. 7-7, elements "channel", "ML detector") {Interpretation: A transmitter, receiver and channel are inherent}. However, Lee does not disclose an omni-directional antenna able to transmit and receive signals.

Driessen discloses a wireless communications system comprising multiple transceivers comprising an omni directional antenna (Fig. 1, elements 16, 26 & Column 5, lines 40-55 & Column 6, lines 65-67 & Claim 24) {Interpretation: The reference discloses a network comprising multiple transceivers i.e. be able to both transmit and receive, further comprising omnidirectional antennas}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Driessen teaches a wireless communication system comprising an omni-directional antenna able to transmit and receive signals and this is implemented in the apparatus as described in Lee so as to be able to receive multipath signals and further provide mobility to the receiver and maintain a reliable communication with the transmitter.

In regards to Claim 18, Lee in view of Driessen discloses an apparatus comprising a demodulator as described above. Lee further discloses said demodulator is able to determine said proximity relation by calculating a minimal Euclidian distance between said received signal and said channel-influenced codeword (Page 265, lines 10-15 & Eq. 7.49) {Interpretation: The ML detector computes the equation 7.49 which minimizes the Euclidean distance between the received signal "y" and the channel influenced signal "ah". Furthermore, minimizing the Euclidean distance to determine the received signal is inherent in a ML detector as is disclosed on Pages 257-259}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Lee in view of Driessen satisfies the limitations of the claim.

In regards to Claim 19, Lee in view of Driessen discloses an apparatus comprising a demodulator as described above. Lee further discloses the apparatus comprising an intermittent filter to individually sample a received codeword containing sampled symbols of said received signal, and to calculate a correlation between said received codeword and a sampled channel response containing channel response samples (Eq. 7.51 & Page 265, lines 20-24 & Fig. 7-6 & Fig.'s 7-7, 7-8, elements "matched filter") {Interpretation: The reference discloses a discrete time matched filter which performs a correlation between the received samples "Y_k" and channel response samples "h_k". Furthermore, since the filter is a discrete-time filter a sampler is inherent so as to sample the continuous time received signal, before performing the filtering i.e. to generate "Y_k" & "h_k"}. Therefore, it would have

been obvious to one of ordinary skill in the art at the time of the invention that Lee in view of Driessen satisfies the limitations of the claim.

In regards to Claim 20, Lee in view of Driessen discloses an apparatus comprising a demodulator and filter as described above. Lee further discloses said filter comprising a finite impulse response matched filter (Eq. 7.51 & Page 265, lines 1-4, 20-24 & Fig. 7-6 & Fig.'s 7-7, 7-8, elements "matched filter" & Page 268, lines 12) {Interpretation: The reference discloses a matched filter models the impulse response of the channel and is implemented as a finite impulse response filter}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Lee in view of Driessen satisfies the limitations of the claim.

In regards to Claim 21, Lee in view of Driessen discloses an apparatus comprising a demodulator as described above. Lee further discloses a decoder to select said demodulated codeword out of a set of possible codewords, based on a filtered signal and an energy-related function of said channel-influenced codeword (Fig. 7-7, elements "matched filter", mixer, subtractor, "select largest" & Page 265, Eq. 7.50) {Interpretation: The filtered signal is interpreted as "Y_K" through the matched filter in Fig. 7-7 and the first term of Eq. 7.50; the energy-related function of said channel-influenced codeword is interpreted as the term inputted into the subtractor of Fig. 7-7 and the second term of Eq. 7.50}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Lee in view of Driessen satisfies the limitations of the claim.

In regards to Claim 24, Lee in view of Driessen discloses an apparatus comprising a demodulator as described above. Lee further discloses said channel-influenced code word comprises a convolution of the channel response over a respective codeword (Page 265, Eq. 7.49, "ha" & Fig. 7-7, element "h_k") {Interpretation: The reference discloses the term "ha" in Eq. 7.49, which is a convolution operation between the channel impulse response "h" and a respective codeword "a"}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Lee in view of Driessen satisfies the limitations of the claim.

14. Claims 22-23 (system) are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (Lee & Messerschmitt; Digital Communications; Copyright 1988, Kluwer Academic Publishers; Pages 257-259, 264-269) in view of Driessen et al. (5,936,578) and further in view of Webster et al. (6,233,273).

In regards to Claim 22, Lee in view of Driessen discloses an apparatus comprising a demodulator and decoder as described above. Lee further discloses an intermittent filter to individually sample a received codeword containing sampled symbols of said received signal, and to calculate a correlation between said received codeword and a sampled channel response containing channel response samples (Eq. 7.51 & Page 265, lines 20-24 & Fig. 7-6 & Fig.'s 7-7, 7-8, elements "matched filter") {Interpretation: The reference discloses a discrete time matched filter which performs a correlation between the received samples "Y_k" and channel response samples "h_k". Furthermore, since the filter is a discrete-time filter a sampler is

inherent so as to sample the continuous time received signal, before performing the filtering i.e. to generate "Y_k" & "h_k"}. However, Lee in view of Driessen does not disclose the filtered signal comprises a combination of interference and an output of the filter and further a decision feedback equalizer to calculate an inter symbol interference of said demodulated codeword.

Webster discloses a decision feedback equalizer to calculate an inter symbol interference of the demodulated codeword which serves to cancel inter symbol interference (Fig. 10, element 107, 104 & Abstract, lines 6-10 & Column 4, lines 23-27, 48-57 & Fig. 6, element 36 & Fig. 8, elements 74-76 & Fig. 12, element 1220) {Interpretation: The reference discloses a decision feedback equalizer which calculates the effects of the inter symbol interference to be canceled from the filtered signal wherein the filtered signal is interpreted as a combination of signal filtered by the matched filter including the interference component which is not canceled by the matched filter}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Webster teaches implementing a decision feed back filter and this is implemented in the demodulator as described in Lee in view of Driessen so as to cancel the effects of both intersymbol interference in the form of post-coursor multipath echo.

In regards to Claim 23, Lee in view of Driessen discloses an apparatus comprising a demodulator and decoder as described above. However, Lee in view of Driessen does not disclose the decoder comprising a fast walsh transform correlator.

Webster discloses a correlator implemented as a fast walsh structure (Column 4, lines 64-65 & Column 10, lines 4-5) {Interpretation: The reference discloses a fast walsh structure for the implementation of the correlation function}. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Webster discloses a correlator implemented in a fast walsh structure and this is implemented in the decoder as described in Lee in view of Driessen so as to implement the energy relate function operation with reduced complexity.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure, it is recommended to the applicant to amend all the claims so as to be patentable over the cited prior art of record. A detailed list of pertinent references is included with this Office Action (See Attached "Notice of References Cited" (PTO-892)).

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sudhanshu C. Pathak whose telephone number is (571)-272-3038. The examiner can normally be reached on M-F: 9am-6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on (571)-272-3042.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sudhanshu C. Pathak
Examiner
Art Unit 2611